tool fall down from any required height. As the rope is raised up and down over the wheel, torsion gives to this heavy tool a circular motion quite sufficient to change the place of the chissel at each descent. Bore-holes of from eighteen inches to two feet in diameter to a very great depth (several hundred yards), for the purpose of ventilation at the Saarbruck mines, have been sunk with facility and economy. Mr. Vignolles then explained the advantage of combining this Chinese method of boring with the improved system of Fauvelle."

MENAI AND CONWAY BRIDGES.

Mr. Fairbairn and Mr. Hodgkinson both read papers on the proposed tubular bridge across the Menai straits, after which considerable discussion took place.

The bridge at Menai, which is to be called the Britannia-bridge, will be supported on four piers, and the distance between the central piers will be 450 feet. The weight of the metal is estimated at 1,200 tons, and it will be constructed of wrought-iron. Mr. Eyton suggested that it would be better to strengthen the tube by inverted iron arches, to protect it from the action of the wind. Dr. Robinson said that, though the bridge might be quite strong enough to bear a dead weight, he thought the engineers ought to ascertain what was likely to be the resilient force on the sudden rushing of the engine on to the bridge. He apprehended also that the vibrations might be cumulative, and increase as the train advanced, until they produced a serious effect. At the same time he trusted to the skill and caution of the engineers, that they would make the tube sufficiently strong, and with respect to the calculated action of the wind at 50lbs. to the square foot, he thought they had exceeded all possible effects of storms by one-half; for a wind acting with the power of 50lbs. to the square foot, must be moving with the velocity of 110 miles in an hour. During the severest storm that he had known the velocity of the wind was not more than fifty miles an hour. Mr. Fairbairn, in reply to these and to other remarks, said that not one-sixth of the estimated breaking weight could be placed on the bridge. The plates on the outside at the top would be nine-sixteenths of an inch, and those inside would be half an inch thick. The bridge from bank to bank, would consist of one rectangular tube, rivetted together and resting on the supports. To avoid the effect of vibration it was intended to lay the rails on vulcanised India rubber, about two inches thick. The tube would be elevated to its position in compartments, to be afterwards rivetted together when fitted. The first compartment nearest the pier would be raised on pontoons at high tide, and fitted into a rest at the bottom of a groove in the pier, up which it would be elevated by hydraulic pressure. The only risk to be feared in fixing the bridge was a high wind during the raising the first compartment, for when that was fixed the remainder would not be attended with risk. With respect to the strength of the bridge to bear a lateral pressure, he said that had not yet been tried, but it would be efficiently tested on the model bridge, and the suggestions of Dr. Robinson respecting sudden impact, and the effect of continued vibration, should be attended to.

ON GAS METERS.

A PAPER on this subject by Mr. Sharp, of Winchester, read before the British Association, may be found useful by many of our readers; we therefore give it entire:—

The use of coal-gas, for illumination, involves so much capital in its production and distribution, that the method of supplying it to the public is of vast importance.

The most equitable mode of doing so appears to be by measure; for, however high the price may be by contract, gas companies, owing to the extravagant and unfair burning, are not compensated; and the consequence is, that in those towns where gas is supplied partly by contract and partly by measure, those who burn by the latter method are charged a higher price than they otherwise would be, in order to meet the loss thus sustained.

Some idea may be formed of the inefficiency of contracts, when it is stated that the orifices of burners are frequently so enlarged, that from 50 to 100 per cent. more gas is consumed than contracted for; thus the honest consumer, who burns his gas by measure is made to pay for the waste of the contract burner.

The position I take then is, that the only terms on which gas should be supplied is by measure.

It is therefore of importance, both to the manufacturer and consumer, that the quantity burnt should be accurately measured; and from the universal application of gas to domestic purposes, the subject is one of extreme interest.

The object of this paper is to inquire into the construction of some of the meters now in use, and it is not my intention to make invidious distinctions. The first to be noticed is the wet meter, so called on account of water being employed in its action. This consists of a cylinder case, within which revolves a shorter cylinder or drum, divided into four equal compartments. The gas as it enters some one of them forces that division to rise, and consequently the whole cylinder to turn round. A pivot or cog wheel is attached to the inner cylinder, which will turn with it, and count its revolutions. In one of these as much gas must pass through as will fill the space of its four compartments over the water line. The capacity of these being known, the quantity of gas will be known also; and it becomes easy to attach a piece of clock work to the machine so adjusted, as to point out on a dial the number of cubic feet that have passed through. About two-thirds of the cylinder or drum revolves in water, and the gas enters the space above the water by an elbow tube, which enters at the axis, and terminates immediately above the surface of the water. As the gas enters and exerts a pressure against the partition, it causes the cylinder to revolve.

This brief explanation of the construction of the original meter, I consider sufficient for the present purposes. The principal objection to this meter consists in the want of a proper adjustment of the surface of the water, an undue quantity of which reduces the capacity of the measuring compartments.

In the meters made by Botton, Edge, Milne, and some others, this is obviated by having an open tube, or waste water-pipe, leading from the proper surface of the water downwards into a close cistern, or waste water-box. There are other objections which create some inconvenience, two of which I will notice: first, the congelation of the water, which stops the supply of gas to the burners; secondly, its evaporation at high temperatures, which alters the water line, and then the meter registers against the company.

These are the principal defects of the original meter, to remedy which a number of attempts have been made by ingenious inventors to produce a meter to work without water. I shall not particularise each meter, but speak of them generally, and inquire how far the difficulties are met by the adoption of the dry meter.

The material of which the measuring chamber of the dry meter is formed, consists of leather or oil silk, which is liable to several objections. The gas is admitted alternately by valves into compartments on either side of the partition; the pressure of the gas occasions the partition to move forward, and as it distends it forces the gas out of that compartment, and the gas so expressed is in quantity to the sweep of the partition. As the diaphragm swells out it pushes before it a metal rod or lever, connected by a shaft with valves, by means of a combination of levers and cranks, with a worm or screw; a circular motion is given, which is transmitted to the registering wheels. It is a very elegant and ingenious method of measuring gas.

There are now several dry meters in use; their construction is very similar.

The objections to this meter as it is at present constructed are very great, and in my opinion fatal to its use. The complication of cranks and valves is a great obstacle; the latter are formed by flat surfaces of metal, and whether sliding or rotatory are very liable to derangement; for if a particle of dust scarcely perceptible to the eye be lodged beneath the valves and valve seat, they become unsound and the registration of the meter is incorrect. Nothing can be more destructive to the materials of the dry meter than the composition which is condensed on the valves and diaphragm, as it is impregnated with ammonia, the action of which upon its delicate machinery must shortly render it very imperfect. The charge brought against the wet meter, of its being subject to variable registration from the difference of the water line, is, as I have shewn, obviated by the inventions of Botton, Edge, Milne, and others; and with regard to the freezing of the wet meter, I consider the objection applicable to the dry meter, as there will generally be sufficient moisture on the valves in cold situations to form a small portion of ice.

It is known that gas cocks and valves freeze under similar circumstances, and it may readily be conceived that those of the dry meter will be liable to the same derangement. No one can be more anxious than myself that an efficient dry meter may be discovered; it will be one of the greatest boons ever conferred on proprietors of gas-works, as well as on the consumers of gas; and although great ingenuity has been exercised to bring it to perfection, it cannot be concealed, that these meters are, as the water meter once was, in their infancy. To what perfection they may hereafter attain no one can foretel, but at present there is nothing to justify their preference to the wet meter.

We do not expect to find it a perfect mathematical measure, calculated to the niceties of chemical manipulation, but we have a just measure. Meters are now made which will measure the gas passed through them with as much accuracy as ordinary balances will weigh and measure the articles we receive for our household use.

The public would have confidence in the gas meter if they understood more about its construction, and persons connected with gas works would find it much to their advantage if they were to instruct those of their customers who were willing to understand the principles upon which it measured the gas.

I would recommend a department connected with every large gas establishment for the purpose of testing all meters, and the consumer should be invited to witness the operation, which would allay suspicion.

In my opinion it is due to persons using gas that means should be taken to convince them of the honesty of the measure by which they are supplied.

" See page 453, *ante*.

LONDON TASTE.

MAY I beg to call your attention, Mr. BUILDER, to the present appearance and state of the tripod lamp in Waterloo-place; for some years it has been disfigured in a strange manner by two rusty iron pipes, running up its stem into a cylindrical box of certainly not much taste in its ornaments. The lamp which surmounts this strange shaft is singularly obscured by the inattention, I presume, either of the gas-light man or of the Bude light hero. The railings as well as the "whole set out," is shamefully neglected, and is crying out for another coat of paint. It would be a charity to get one of the red jacketted sweepers to use his besom in freeing the inclosure of *stones, dirt*, &c. Will you, Mr. BUILDER, use your influence in restoring this unfortunate luminary to its original shining appearance and condition?

I also wish you would ask the parochial authorities of St. James's Church, Piccadilly, to endeavour, either by pointing, or cleaning, or compoing, or by any other means you and they think best, to put a better and less gloomy look on the exterior of their splendid building. I am sure that Sir Christopher Wren never wished so much dulness to be seen in any structure, and least of all in a church. The parish now have a capital opportunity of embellishing the outside, as they have all the scaffolding poles, men, and materials, &c., inside the church, and therefore at hand. Hoping this will cause attention in the proper channels, I am, Mr. BUILDER, your constant reader,

Sept. 14th, 1846. A LONDONER.

NEW EPISCOPAL COLLEGE.—The foundation-stone of the Trinity College for episcopalians, near Perth, was laid on Tuesday week.

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